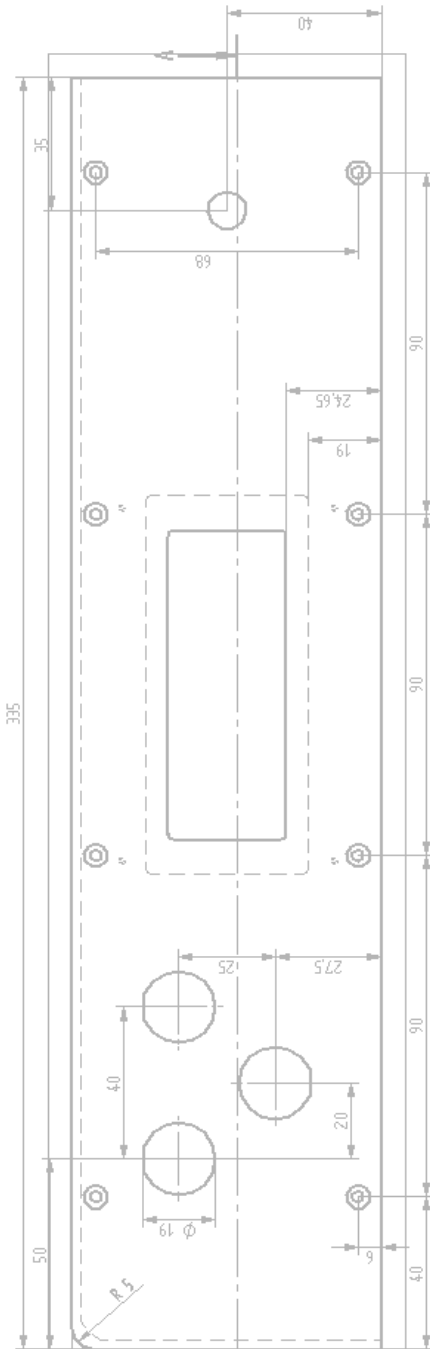


Technology for Dental Materials Research

Issue 2007



In the past...

Research time, money and energy were exhausted searching a company which could design and build cost effective equipment or prototypes.

Testing Machines were designed by own engineers with little or no knowledge and experience in dental material research. Or equipment designed for other purposes was adapted to suite the needs of research. All of them consumed the most vital components of any research program:

Time, energy and money.

Today...

Researchers can spend time and energy focusing on what is one of the most important things: Dental Material Research.

As one of a few companies in the world specialized in professional machinery for dental material research, SD Mechatronik provides the optimum tools to fulfil individual research needs. Operation and installation ready!

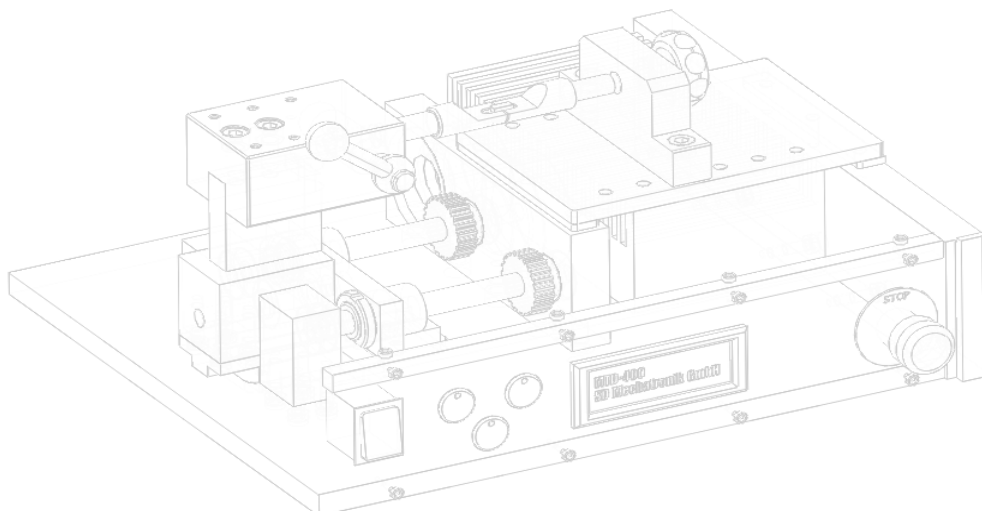
SD Mechatronik offers the empirical knowledge and craftsmanship to develop and produce unique tools demanded by ambitious research programs.

We offer basic mechanical design up to the development of complex electro-mechanical systems. Even software programming and the design of optical components is part of nearly every user-specific development.

We provide each client with products and workmanship of unparalleled quality!

SD Mechatronik supplies high-end mechanical engineering services to specialized markets where quality services are either impossible to come by or completely unaffordable.

Whether your research requires equipment from our standard product line or a custom-made prototype, SD Mechatronik is a competent partner for your research needs!



About the company

Dipl. Ing. (FH) Sebastian Duy is the General Manager of SD Mechatronik GmbH, located in the south of Germany near Munich. After finishing his studies in medical devices technology, he was working in the R&D department of a well known company in the field of medical diagnostic instruments for several years.

SD Mechatronik GmbH offers you product development and design from the first drawing to the start of production. Our team has a long time experience in the field of

- Medical technology
- Mechanical engineering and injection moulding
- Electronics development
- Optics
- Measuring-controlling and regulating
- LED-technology and image processing



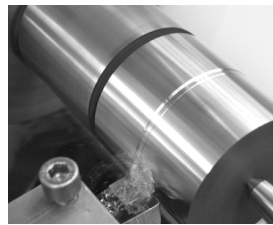
So we can offer you the expert advice you need!

Our main target is to develop new products and to improve existing products for most exact material- and composite evaluation. Our products are developed in close co-operation with leading research institutes in Germany and Liechtenstein. The results of this collaboration are first-class quality and practice oriented products. Users from around the world appreciate the Thermocyclers' reliability and durability as well as the precision and reproducibility of results achieved with the Chewing simulator.

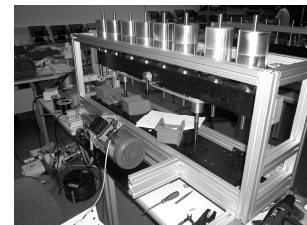
We provide you with the ideal solutions to support your research work. As we have our own production facilities, we can quickly react to your individual needs.



Beginning from Research & Development...



over precise manufacturing...



to assembly ...

Expect the highest quality

Our Products

By this time, the results of our dental research products are renowned as a worldwide standard. As we only use high quality components, we can guarantee best reliability as well as easy maintenance and replacement of components.

Customer benefit is our highest aim. This is why you can expect:

- Approved usability
- Easy and intuitive handling
- Exact and understandable user manual

Our products are easy to set up and operate. We strictly follow the "plug and operate" strategy. However, if you require any assistance, our after sales support will be pleased to help you!



Many test runs before...



each product is approved...



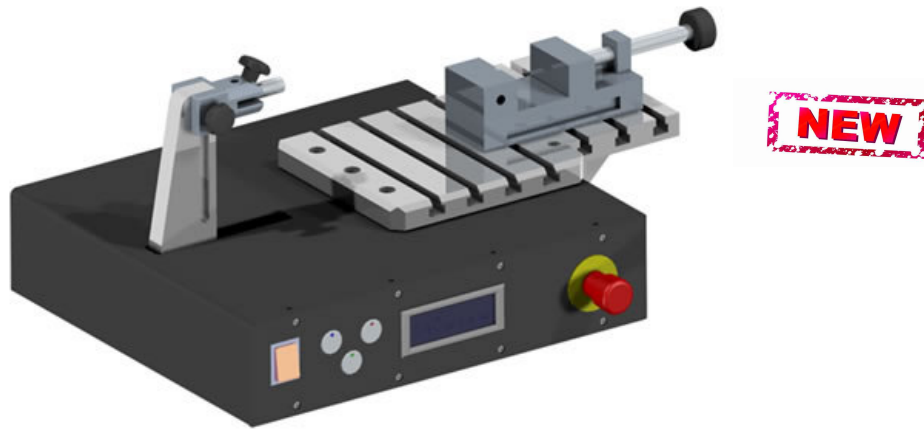
for shipping to our customers!

Made in Germany

Micro tensile test machine

MTD-500

The micro tensile test machine **MTD-500** can be used for micro tensile- and compression tests with dental composites and other materials.



Principle of operation

A servo motor with planetary gear transmits a rotation to two backlash-free biased spindles. The spindles move the sample holder in horizontal direction up to 50 mm while the opposed sample holder remains in its position. The path measurement takes place directly at the sample holder. Therefore the result is independent from the compliance of the force sensor.

A highly precise force- and excursion- measuring system as well as the very stable construction and the use of high grade components allow exact reproducibility and high durability. As an option we can provide a force sensor traceable to national standards.

The included software allows easy control of the machine. Due to the wide scope of analysis possibilities, many different charges can be simulated and graphically displayed. Presentation and documentation of the results can easily be made with the built in report function.

A broad scope of accessories allows the use of the **MTD-500** with many different materials and for individual needs. Different jaw chucks and sample holders are available.

Specifications

- Easy and safe clamping of the samples
- Tensile- compression and bending simulations for the evaluation of composites
- Dynamic stress tests of metal and plastic parts
- Measurement of tension springs and elastic parts

Software features for determination of

- Strain
- Breaking load and tensile strength
- E-Modulus (elastic modulus)
- Calculated Brinell hardness
- Spring constant

Power supply

- 1x 230 V~

Installation

- The **MTD-500** can easily be set up and configured by the customer
- A detailed operation instruction is included; if necessary, telephone support is available

Optional

- 115 V~ version
- Revocable log file

Scope of supply

- **MTD-500** with
 - Standard sample holders and special plates for composites
 - PC connection cable
 - Software

Technical data

With a maximum force of 500 N and a maximum measurement range of 50 mm, there is enough reserve for a wide range of applications:

- Tensile- and pressure strength: 500 N
- Slideway: 50 mm
- Slide speed: 0 to 150 mm/min
- Resolution: up to 0,5 µm
- Reproducibility of the force sensor: 0,05%
- Dimensions: 350 mm x 295 mm x 177 mm (length x widths x height)
- Weight of the device approx. 30 kg

Thermocycler THE1100/1200

The Thermocycler with its cold and warm bath tank is used for simulation of thermal load cycles of composites.



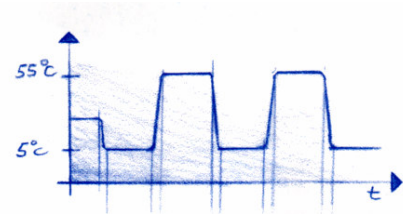
Principle of operation

An open sample container is immersed cyclically in baths of warm and cold fluid. The following parameters can be set by the user: Resting time in warm and cold bath tank, drip off time, number of cycles, auto refill of the warm bath tank and auto start function

The entered parameters as well as the actual process status are displayed.

Specifications

- Auto start (the process will continue after power blackout)
- Refill device (automatically adds water during long term experiments)
- Resting time in warm bath tank (1 – 7200 sec.)
- Resting time in cold bath tank (1 – 7200 sec.)
- Drip off time (1 – 999 sec.)
- Position of sample basket at the end of the process: Warm bath tank, cold bath tank or drip off position
- Number of cycles and resting time in bath tanks can be set by the user
- Fluid temperature in bath tank can be set from -5 to 100 °C (pay attention to antifreeze additive or evaporation)
- Overheating protection
- Protection against mechanical obstruction of the swing arm
- Easy to clean stainless steel tanks
- Release valve at the lower front side of both tanks
- Stainless sample basket (10x10x10 cm with grid size 1 cm)



A high slew rate as well as exact and homogeneous temperatures – ideal for simulation of temperature changes in the mouth

Performance

The cooling capacity depends on the surrounding temperature. At a room temperature of 21°C and with normal cooling configuration (300 W), approximately 300 – 350 g of metallic samples can be examined with a resting time of 30 sec. and with an exchange temperature of 5°/55°C A higher corresponding amount of plastic samples can be examined. The sample capacity depends on the heat capacity and the surface of the sample.

The maximum sample weight is 1000 g.

Software

- All parameters can be set via the display and the keypad
- Overload protective system (auto stop at system malfunction)
- Auto stop of the refill pump at empty canister

Power supply

- 230 V~ (16 Ampere), four power sockets are required

Installation

- The THE1100/THE1200 can easily be set up and configured by the customer
- A detailed operation instruction is included; if necessary, telephone support is available

Optional

- Cooling device with 300 or 500 W (THE1100 / THE1200)
- 115 V~ version is available
- English software version is available (THE1100e / THE 1200e)

Scope of supply

- Thermocycler with control device, emergency off switch and refill pump
- Warm- and cold bath tank with thermostat
- Immersion cooler
- Refill canister (10 litres)
- Connection hose between bath tanks and refill hose for warm bath tank
- Cover balls to prevent evaporation (100 balls Ø20mm per bath tank)
- Installation- and operation manual

Technical data

- Temperature bath tank 1: 25 °C to 100 °C
- Temperature bath tank 2: -5 °C to 100 °C
- Resting time of the sample basket can be set from 1 to 7200 seconds
- Automatic refill of the warm bath tank to compensate evaporation
- Auto start function; no PC is required to carry out experiments
- Cooling device available with 300 or 500 Watt

Multifunctional Chewing Simulator

CS-3

The CS-3 is used to simulate different chewing processes in the mouth and thereby evaluate the durability of composite materials. Due to programmable motion patterns of two axels and individual weight adjustment, any movement can be simulated.

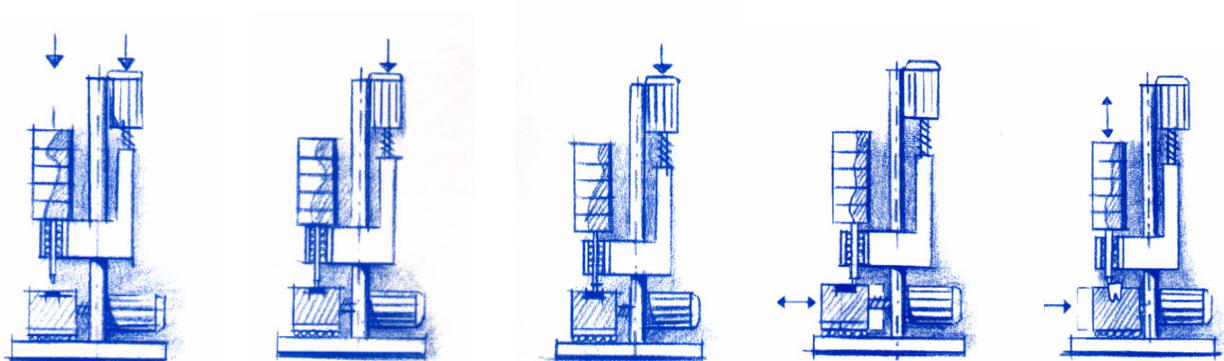


Principle of operation

For a chewing simulation, the samples must be inserted to special sample chambers on the horizontal traverse. Then, holders for the desired antagonists must be applied to the vertical traverse. Likewise the desired weights must be applied to the vertical traverse. After setting the required parameters for vertical and horizontal movement and the number of strokes, the process can be started. The powerful engines allow fast movements even with high load.

Due to the technical design of the Chewing simulator, all samples and all antagonists follow identical motion patterns and kinematics. Data thus obtained is perfectly reproducible. Thanks to the free weight bearing, only the exact weight force is applied to the samples at the moment of impact – loss-free and clearly defined.

The impact speed can be set individually to initiate a momentum that ends in a constant weight force.



Kinematics of a simulation in the CS-3

Specifications

- Control- and monitoring unit runs under MS Windows
- Eight large adjustable sample chambers (Ø 90 mm) can be filled with different sample holders (single teeth, bridges, complete maxilla models)
- Any antagonist can be used
- Sample chambers as well as antagonists are coupled via horizontal and vertical traverses, thus identical kinematics and reproducible results are achieved.
- Adjustable weight force in steps of 10 N from 10 N up to 120 N; with special weight arrangement up to 350 N for two sample chambers.
- Movement parameters:
 - Upwards/downwards speed 10 to 90 mm/s
 - Forward/backward speed 10 to 90 mm/s
 - Chewing frequency approx. 0.1 Hz to approx. 3.5 Hz
 - Vertical stroke 0.1 mm to 99 mm
 - Horizontal stroke 0.1 mm to 38 mm
 - Combined X-Z-movement

Performance

All modes, set parameters and processes can be configured and can be saved for later use/iteration. The parameters can easily be set (menu driven) and the operation of the Chewing simulator can easily be learned using the enclosed instruction manual.

The status quo of the simulation can be monitored as well as the remaining simulation time

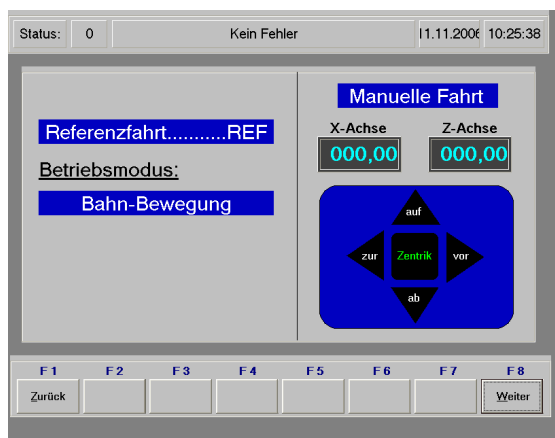
Status bar for error messages and date/time.

Auto power off at malfunction or after incorrect parameter setting.

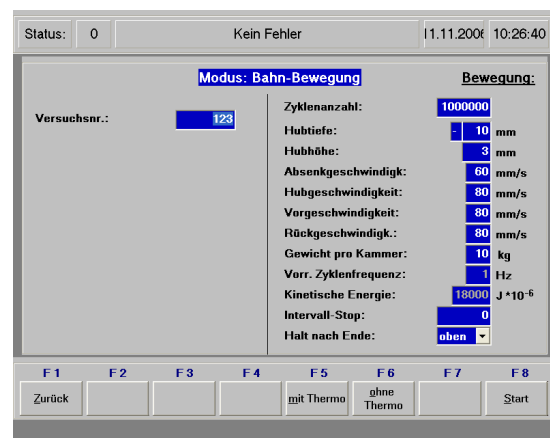
Safety shutdown when front door is opened during operation.

Software

- Easy to handle MS Windows based software with update- and remote diagnostics tool
- Colour TFT-display
- Connectors for network, printer, mouse and keyboard



Screenshot: Manual operation



Screenshot: Simulation parameters

Power supply

- 1 x 230 V~

Installation

- The **CS-3** can be installed by the customer. The chassis must be able to carry approx. 250 kg.
- A detailed operation instruction is included; if necessary, telephone support is available and on-site training

Optional

- Special weight arrangement
- Breakage recognition for each sample chamber
- On-site training
- 120 V~ version



Degussit globes acting as antagonists

Scope of supply

- Control unit with
 - Industrial PC
 - SPS-controller
 - Stepper motor power card
 - Floppy disk drive
 - Power cable
- Mechanical unit with
 - Different weights (40 N, 20 N, 10 N)
 - Optional special weight arrangement (max. 350 N)
 - Grease gun (with filling)
 - Oil gun (with filling)
- Assembly- and operation instruction



Ground composite – ready for installation to the sample chamber

Technical data

- Eight sample chambers
- Simulation of complete chewing cycles with X-Z-movement
- Simulation of gnashing movement
- Simulation of slipping of two teeth against each other
- Simulation of the impact of one tooth into another with different speed and intensity (from a slight scrape to hard impacts)
- All relevant parameters are recorded
- Dimensions of the control unit: 650 x 365 x 715 (mm) (length x width x height)
- Dimensions of the mechanical unit: 1370 x 760 x 690 (mm) (length x width x height)
- Weight of the control unit: approx. 30 kg
- Weight of the mechanical unit: approx. 150 kg



Sample chambers can be filled with water, the height of the antagonist rods can be adjusted with fine threaded screws

Three-Media-Abrasion-Machine

TMA

The **TMA** can be used to carry out tribolic abrasion tests with composites. The **TMA**s design complies with the DeGee guidelines.

Principle of operation

Up to 12 test materials are inserted into a multi-chambered sample wheel. The machine provides a function for cylindrical grinding of the sample wheel. A textured and hardened counter-wheel runs in contact with the sample wheel, and abrasion is effected by the counter-wheel's smaller size, the difference in speed between the two wheels as well as the applied medium. Different parameters like grinding pressure, distance of the wheels, rotation speed and direction can easily and precisely be set. Thus, exact wear tests with different composites can be carried out.



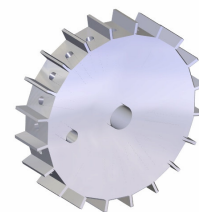
In association with the **TMAM** (Three-Medium-Abrasion-Measuringsystem) we offer a complete system for the exact abrasion, measurement and analysis of samples. The steady construction, usage of high quality industry components and professional assembly ensures trouble-free operation over years.

Specifications

- Number of cycles can be set
- Separate power switch for both engines
- Rotational speed of both motors: independently adjustable from 0 to 200 / 250 RPM
- Blocking and reversing of rotational direction is possible with left motor
- Sample wheel can hold up to 12 different sample materials
- Cylindrical grinder wheels for sample preparation
- Adjustable press load: 0 to 50 N
- Automatic shut-off at end of run, as programmed by operator
- Red grinding control LED

Performance

- The sample wheel with 12 different chambers allows testing of different composites at once.
- An agitator is applied to the sample wheel, thus a homogeneous abrasion medium can be guaranteed.
- Powerful servo engines can easily cope with high-viscous liquids.



*Sample wheel for the **TMA***

Simulation parameters

- Number of cycles
- Rotational speed of both motors is independently adjustable
- Exact grinding pressure due to calibrated weights

Power supply

- 1 x 230 V~

Installation

- The **TMA** can easily be set up and configured by the customer
- A detailed operating instruction is included; if necessary, telephone support is available

Optional

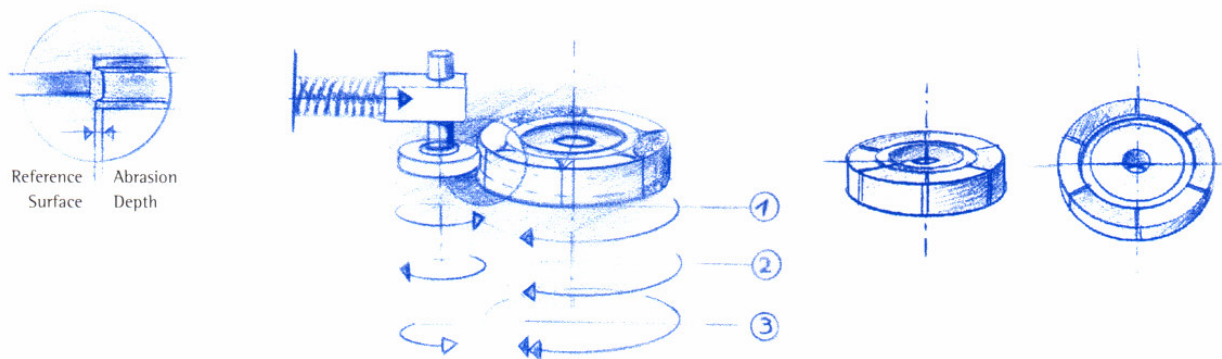
- 115 V~ version
- Individual antagonist wheels

Scope of supply

- **TMA** with
 - Weight-bar and weights (10 N, 5 N, 2,5 N)
 - Tumbler with cap
 - Shaped part set (2 steel disks, threaded rod with 2 wing nuts)
 - Agitator
 - Adjustment disc
 - Sample wheels with 12 chambers (10 wheels)
 - Spacer
 - 2 grinding wheels with different granulation
 - Antagonist wheel
 - 2 nuts M6 with shim
 - Tool kit
 - Power cable
 - Operating instructions

Technical data

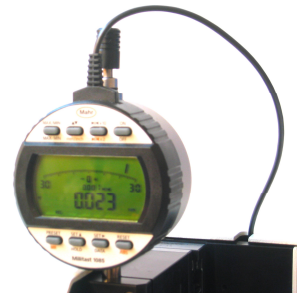
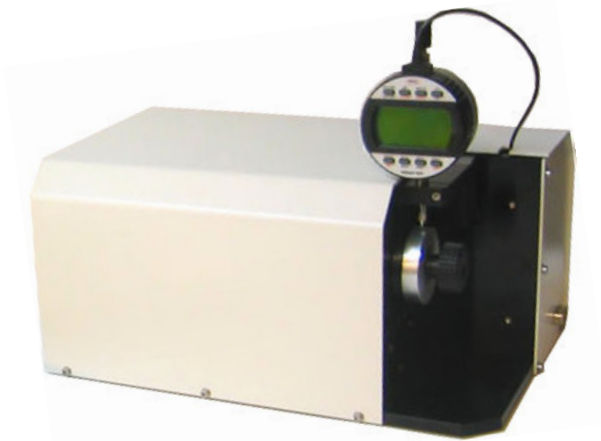
- Dimensions of the **TMA**: 360 x 320 x 370 (mm) (length x widths x height)
- Weight: approx. 30 kg



*Tribolic stressing of material in the **TMA**
The rotational directions (1,2,3) are user defined*

Three-Media-Abrasion-Measuring System TMAM

The Three-Medium-Abrasion-Measuring System **TMAM** was developed to automatically analyse and evaluate the results of the Three-Medium-Abrasion Tests on a standard PC.



*High precision dial gauge on the **DMAM***

Principle of operation

It is very simple to use: The abraded sample wheel gets inserted into the TMAM. The analysis gets started via the included PC. After the analysis the results can be examined on the PC. The pre-installed software creates MS-Excel compatible files in .txt-format. Therein the coordinates of the surface of the sample wheel is displayed. A comfortable software supports the user with scientific analysis of the 12 sample chambers. Special Excel macros feature automatic scientific analysis of 12 specimens per sample wheel. Abrasion volumes of all samples are listed in a 3-D ranking diagram for quick comparison.

Specifications

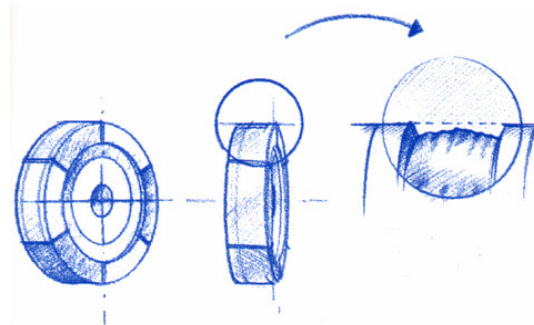
- Automatic measurement of the abrasion volume of all 12 sample wheel chambers
- Resolution: 3.600 points per chamber (90 points per line, 40 lines per chamber)
- Accuracy: 0.002 mm in z-direction (height of the abrasion volume)
- Measurement time per sample wheel (12 chambers): 4 h
- Software: Analysis of 43.200 points per sample wheel, abrasion volume, 3D surfaces, 2D slices along the measuring line, comparison chart for 12 samples.
- Data: .txt-file, compatible with Microsoft Excel

Performance

- Measurement time per sample wheel: 4 h
- Number of points per sample wheel: 43.200
- Graphical analysis of single sample chambers

Power supply

- 1 x 230 V~



Installation

- The **TMAM** can easily be set up and configured by the customer
- A detailed operating instruction is included; if necessary, telephone support is available

Optional

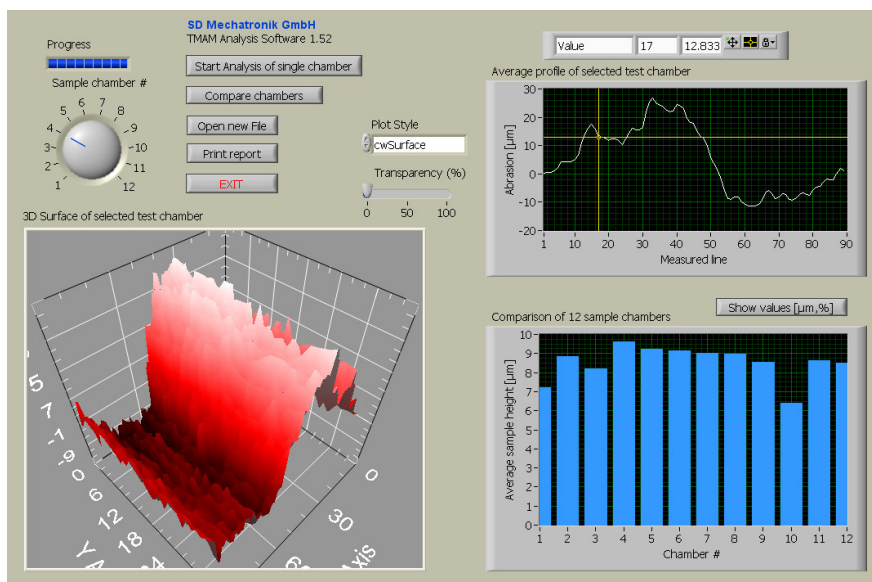
- 115 V~ version

Scope of supply

- **TMAM** with
 - Dial gauge
 - Power cable
 - Connection cable to the PC
 - Operating instruction
 - Measurement and Analysis Software on CD

Technical data

- Dimensions of the **TMAM**: 320 x 200 x 160 (mm) (length x widths x height)
- Weight: approx. 10 kg



NEW

Chamber No. 1-12:

All values are in μm

7.218
8.862
8.190
9.625
9.212
9.142
9.000
8.981
8.541
6.396
8.635
8.506

Values above represent the average abrasion of each chamber. Below you see the average abrasion in percent:

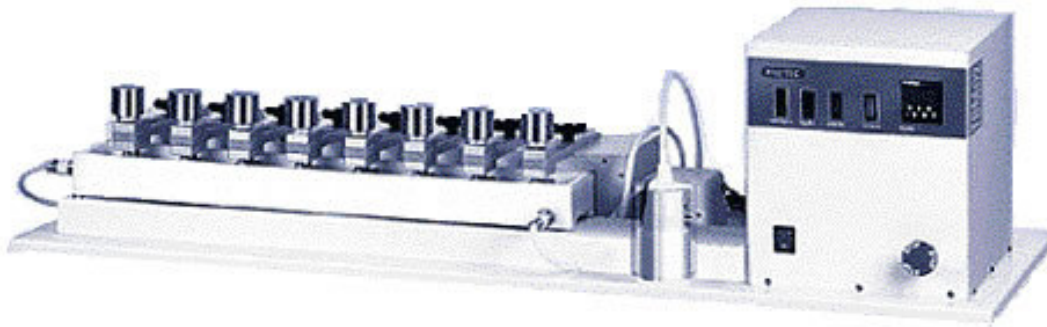
49.983
84.145
70.168
100.000
91.407
89.950
86.998
86.616
77.471
32.907
79.420
76.734

OK

Powerful and easy to use Analysis Software

Toothbrush Machine ZM-3

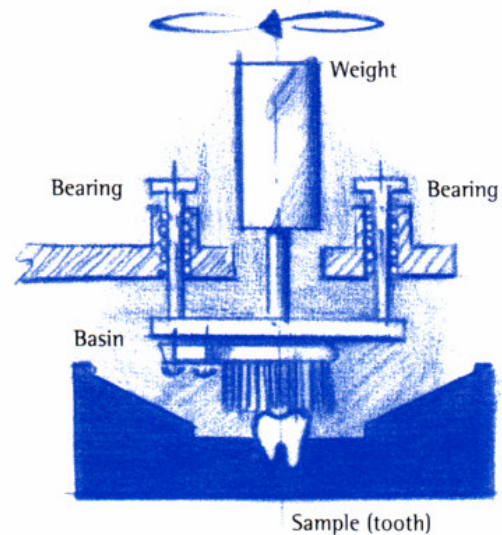
The toothbrush machine **ZM-3** is designed to evaluate toothbrushes on sample bodies. It can also be used to simulate abrasion processes on teeth.



Principle of operation

Up to eight samples can be inserted in the toothbrush machine. The samples can have different shape and material (hardness grade). Also the samples can be exposed to different weights. The sample chambers are separated from each other to ensure that each sample can be treated with another liquid (mixture of toothpaste and water). Each of the eight sample chambers is fixed with a locking screw. This ensures easy cleaning of the sample chambers.

To allow the use of a wide range of available brushes, the brushes can be fixed using two screws. The brushes must be shortened and provided with two drilling holes. All brushes are driven by a single engine, i.e. the chosen motion pattern is used for all samples. Thus, the simulation results can easily be compared with each other.



*Principle of the **ZM-3***

The test procedure must be started manually and ends after the pre-set number of cycles is reached. The procedure can be stopped earlier via the key panel and by using the emergency switch.

Specifications

- 8 sample chambers
- Weights from 50 g to 300 g per sample in steps of 50 g
- Up to 4.000.000 cycles can be set, Auto-Stop function after reaching the pre-set number of cycles
- A key panel is used to set the number of cycles and the motion pattern. The current settings as well as the actual number of cycles are shown in a double spaced display
- Motion pattern includes forward- and backward motion, and circular motion as well as a combination of both patterns
- The contact face of the samples can be up to 20 x 20 mm; the height of the samples can be up to 15 mm
- A sample form (20 x 10 x 2 mm) will be delivered with the toothbrush machine

Performance

- Commercial toothbrushes can be used
- Toothpaste-water mixture can be chosen individually
- Single screw fastening of the sample chambers
- Easy cleaning of the sample chambers

Software

- SPS-based
- RS 232-interface
- All parameters can be set and monitored via the display
- Overload protection (with automatic power off in case of malfunction)

Power supply

- 1 x 230 V~

Installation

- The **ZM-3** can easily be set up and configured by the customer
- A detailed operating instruction is included; if necessary, telephone support is available

Optional

- 115 V~ version

Scope of supply

- **ZM-3** with
 - Control unit
 - Brush unit
 - Weights (48 weights with 50 g each)
 - 20 Screws for fixation of the sample chambers
 - Sample form 20 x 10 x 2 (mm)
 - Connection cable for PC
 - Power cable
- Operating instruction

Technical data

- Dimensions **ZM-3**: 1000 x 700 x 280 (mm) (length x widths x height)
- Weight: approx. 40 kg

What else can we do for you?

SD Mechatronik's standard product line has been designed to be as flexible as possible; for example, all sample holders in our Chewing simulator are easily removable and replaceable. Should your research require an alternative holder, our engineering staff can quickly design and manufacture specialized parts. Further, our engineers are prepared to develop a completely new machine, adapted to your specifications!

We are experienced in engineering-for-hire projects. This experience, in combination with our substantial background in dental material research, will render the process of designing and producing such specialized equipment time- and cost effective.

We are trying to build a worldwide network of distribution partners for our products. Currently our partners are:

Germany:

CompoDent Germany Ltd.	<i>Contact:</i>
Hermannstr. 12	Carmen Burkhardt
73207 Plochingen	Tel.: +49(0)7153 6149-370
	Fax.: +49(0)7153 6149-375
	E-Mail: info@compodent.com

India:

TECHNILAB INSTRUMENT	<i>Contact:</i>
No. 10/8, 3rd Cross	J. Ravikumar
Banaswadi Main Road	Tel.: 0091 80 25805029
Maruthi SevaNagar	Mobile: 9845485964
BANGALORE - 560 033	E-Mail: technilab@vsnl.net

China (Hong Kong):

EVERKING ENTERPRISE (HONGKONG) CO. LIMITED	<i>Contact:</i>
Unit D 10/F China Overseas Building 139	Samuel Sun
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China (mainland):

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